

REMARKS

Responsive to the outstanding Office Action, applicant has carefully studied the Examiner's rejections. Claims 24, 32 and 42 have been amended herein. Claims 43 and 44 are new. Favorable reconsideration of the application in light of the following detailed arguments is respectfully requested.

REJECTION OF CLAIMS UNDER 35 USC §112

Claims 24-42 were rejected under "35 USC 103a" for obviousness, but the rejection stated by the Examiner appears to be a rejection under 35 USC 112, and the claims have been amended as if the rejection was under 35 USC 112. Claims 24 and 32 were amended to remove the "preferable" and "ideal" language and claim 42 was amended to be placed in what is believed to be a preferable claim form. Claims 43 and 44 were newly presented to include the language which had previously been optional in claim 24.

It is therefore believed that the claims fully comply with the requirements of 35 USC §112, second paragraph, and it is respectfully requested that this rejection be reconsidered and withdrawn.

REJECTION OF CLAIMS UNDER 35 USC §103

In the outstanding Office Action, the Examiner rejected claims 24-42 under 35 USC §103 as being unpatentable over Breuer '072.

The '072 reference discloses a method for manufacturing a microreactor. The present application discloses a microreactor and a method for using the microreactor. In this regard, it is very important to note the defined "hydraulic diameter" and the ratio of the spacing between the smallest perpendicular distance between two neighboring spacers to the slot height of the reaction chamber after coating with a catalyst, which are essential to the invention, both for its structure and use, and, therefore, to its manufacture. It is respectfully submitted that these ratios, as defined and claimed in the present application, are significantly different from those in the applied reference. These claimed dimensions are shown and discussed in paragraph [0012] of the present application. The specific dimensions chosen, compared to those of the applied art, provide several significant advantages compared to the known device.

Paragraph [0011] of the application as filed notes that "Surprisingly it was discovered that, after the catalyst is applied, the cross section of free flow in the microstructures of this construction has to display a hydraulic diameter of less than 4000 μm and a ratio of slot width to slot height of less than 800." Further, in paragraph [0012] these dimensions were elaborated on and it was noted that "Surprisingly it was discovered that undesirable fluid and chemical side effects are negligible in the reaction chamber with such a plate construction." As is noted in paragraph [0013] the dimensions are selected such that they are "enabling a quasi isothermal operation of the microreactor."

Paragraph [0017] of the claimed invention summarizes several advantages of the dimensions claimed in the present invention:

The flow characteristics, diffusion effects and material transport operations can be very well simulated and optimized in defined slots. At the same time it is possible to suppress the effect of cross flow and backmixing. The side faces of the webs serve the catalyst adhering to the walls as a contact and adhesion surface, thus stabilizing the catalyst bed. In manufacturing terms, plates with uniform slots or webs can be manufactured on standard machines very economically and with little technical outlay. It was discovered that to provide an adequate bearing surface the share of the standing or base area of the spacers on a plate forming a reaction or heat carrier chamber in relation to the overall area of the plate lies ideally in the range of 5-15%, and that this share should be above 2.5% but not exceed 30%. The reference surfaces in this case are only those faces of the plates which lie within the circumferential gaskets and welded or soldered sealing seams terminating the reaction chambers or heat carrier chambers. The plate material positioned outside the gaskets is largely comprised of solid material and has no importance for the previously mentioned analysis of the load bearing surfaces. Given a high pressure difference between the process chambers and the heat carrier chambers, the head faces of the spacers thus enable an adequate load bearing ratio for passing on the force of a contact pressure applied through the two end plates or terminal anchors or anchor plates. If the spacers are constructed as webs, the smallest web width is 1000 μm . A web width of more than 6000 μm is generally no longer of interest in terms of cost-effectiveness and manufacturing.

It is respectfully submitted that only in view of the present invention would these specifically claimed dimensions be chosen, and outside of this disclosure, one skilled in the art would not choose these specific ratios as defined in the claims herein.

As the applied reference describes a method of making a catalyst layer laid on the chamber plates of a microreactor, and the claimed invention, to the contrary,

describes a microreactor itself with with a detailed dimensions, it is submitted that this distinguishes over the applied art of record.

As claims 25-44 depend, directly or indirectly, from an allowable claim 24, it is submitted that those claims are allowable based, at least, upon their dependence from an allowable base claim.

SUMMARY

It is believe that the above amendments place the application in condition for allowance. Should the Examiner wish to modify the application in any way, applicant's attorney suggests a telephone interview in order to expedite the prosecution of the application.

Respectfully submitted,

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